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A NEW TREMATODE, *ACANTHATRIUM NYCTERIDIS*,  
NOV. GEN., NOV. SPEC., FROM THE LITTLE  
BROWN BAT.<sup>1</sup>

BY ERNEST CARROLL FAUST

The material described in this paper was taken from the small intestine of a female *Nycteris borealis-borealis* (Müller). The bat was found in the vicinity of Urbana, Illinois and brought to the writer during the summer of 1918. With the female were two suckling young which were uninfected. Of the ten individuals of the new parasite found, two were studied alive and the remainder preserved and studied as totos and sectioned material. In the living specimens the details of the excretory system were worked out and the process of fertilization observed.

This species conforms to the previous diagnostic rules prescribed for the genus *Lecithodendrium* in the shortness of the digestive ceca, the position of the uterine loops, the general type and position of the testes and vitellaria and in the absence of a muscular cirrus. However since the structure of the organs immediately surrounding the genital pore are important criteria on which generic diagnosis is made, it seems necessary to create a new genus to include this species and *Lecithodendrium sphaerula* Looss 1896, which possess in common a genital atrium lined with numerous lanceolate spines. I propose the name *Acanthatrium* for this new genus.

*Diagnosis of Acanthatrium nov. gen.* Small-sized Brachycoeliinae, spherical to pyriform, with a genital atrium lined with numerous integumentary spines; prostate glands numerous; testes preacetabular, in a plane with the genital pore; vitellaria anterior to the digestive ceca; excretory system with four groups of flame cells of three each for each half of the body; in intestine of bats. Type species: *A. nycteridis*.

<sup>1</sup> Contributions from the Zoological Laboratory of the University of Illinois, No. 138, and from the Department of Pathology, Peking Union Medical College.

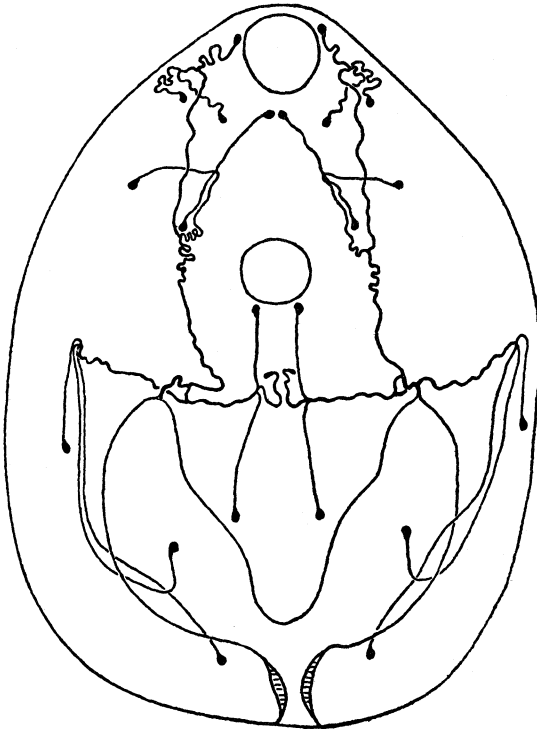
*Acanthatrium nycteridis* nov. gen., nov. spec.

Host: *Nycteris borealis-borealis* (Müller), small intestine

Locality: Urbana, Illinois

Date: July, 1918

*Acanthatrium nycteridis* is a broadly oval to pyriform fluke which normally measures 0.185 to 0.2 mm. in length by 0.15 to 0.16 mm. in width, but on contraction may become much broader or longer. All specimens examined have been found to be spineless on the external integument. The oral sucker measures up to 25  $\mu$  in diameter and is



Text fig. 1. The excretory system of *Acanthatrium nycteridis*.

consequently much larger than the acetabulum which always measures less than 16  $\mu$ . The latter organ is situated some two-fifths distance from the anterior end of the fluke. The oral opening leads directly into a very muscular pharynx, 6  $\mu$  in diameter by 4-5  $\mu$  in

length. The ceca compose a short broad furculum lying between the vitelline glands on the anterior face and the prostate glands on the posterior face. They extend laterad as far as the testes. The walls of the ceca are heavy, and the cells of which they are composed distinctly glandular.

The excretory system of this species has been studied very carefully in the living animal subjected to slight pressure of the cover glass. Not only have the main canals of the system been made out but the exact number and relationship of the capillaries and flame cells have been determined. These latter comprise four triplet groups for each side of the body, making a total of twenty-four cells for the worm. The excretory pore is posterior. It leads into a single muscular shank of short length (see text fig.) which soon expands into two long pouch-like cornua. These cornua extend anteriad to a plane somewhat back of the middle of the body. There each cornu receives a single very short main collecting tubule. Into this main tubule flow two secondary tubules, one of which is derived from a double set of three capillaries each lateral and posterior to the main tubule and a second which is derived from a double set of three capillaries each arising anteriad and somewhat mesad. At the end of each capillary is a small flame cell. Designated from the anterior end backward (Faust 1919) group  $\alpha'$  lies ventrad to the median frontal plane of the fluke, laterad and slightly posteriad to the oral sucker. Group  $\beta'$  also lies ventrad, but laterad to the prostate glands. Group  $\alpha''$  lies dorsad, in the region just posterior to the acetabulum. Group  $\beta''$  lies ventrad to the cornu on each side. A view of the individual flame cell under the highest powers of the microscope shows the "flame" to consist of a relatively small number of flagella which are noticeably thick at their distal ends. No excretory granules appear in the system.

Previous studies on the excretory system of the Brachycoeliinae (Looss 1896: Fig. 50) are fragmentary, but are consistent with the data I have secured from the study of the species *Acanthatrium nycteridis*, namely, that there is a common flame-cell plan for the Brachycoeliinae. On the basis of this scheme it is expected that there will be found in each species of the sub-family twenty-four flame cells, consisting of four triplet groups of flame cells on each side of the body. Furthermore, the work of Wright (1912:167-169) on the

related family Microphallinae gives weight to the view that there is a fundamental plan of flame-cell grouping in the family. For, in *Microphallus opacus* altho there are only sixteen flame cells in the adult worm, they consist of four couplet groups for each side of the body, so that the four groups are to be regarded as elemental, hence fundamental. Moreover, the rather inadequate study of Jägerskiöld (1900) on the excretory system of *Spelotrema pygmaeum* demonstrates at least the fourfold structure in this species. Thus as I have remarked (1919) "the mathematical exactness of flame-cell formation of this family makes it possible to calculate the flame-cell formula of the cercaria from the structure of this system in the adult."

The genital system in *Acanthatrium nycteridis* is characteristically lecitodendrine. The ootype is located to the right and somewhat posterior to the acetabulum. The vitelline follicles, ten to twelve in number, lie lateral to the pharynx and esophagus and anterior to the ceca. They are somewhat lobed. Two vitelline ducts, dark brown in color, arise from the two groups of follicles. Extending over the ceca and prostate glands, they bend toward the median line and converge behind the acetabulum. From this junction a common vitelline duct proceeds to the ootype. The ovary is an irregular pyriform body, somewhat smaller than the testes and located anterior to the ootype, in the plane of the acetabulum. It is connected with the ootype by a short duct. A minute seminal receptacle opens into the ootype from the right side. From the side of this receptacle a delicate Laurer's canal extends toward the integument of the dorsal side of the worm. The uterus arises from the posterior side of the ootype. Its convolutions first fill the posterior half of the right side of the fluke, then turn to the left side, crowding the entire region up to and often encroaching upon the left testis. The uterus enters the genital atrium to the left of the ejaculatory duct.

The testes are ovoid to pyriform glands occupying the same transverse plane as the genital pore and the surrounding prostate glands. They are definitely antacetabular. Vasa efferentia carry the spermatozoa mesad to the base of the seminal vesicle on the anterior border of the acetabulum. The latter organ coils to the left and then forward. It passes almost imperceptibly into the short ejaculatory duct. This duct opens into the genital atrium thru a small pore. The prostate glands surrounding the metraterm and opening

into the ejaculatory duct consist of a large spherical mass of unicellular glands.

The genital atrium lies mostly anterior to the genital pore. It is elongate and coiled on itself several times, and is lined with a large number of sharp lanceolate spines. The genital pore is large with a prominent sphincter muscle.

The mature uterus is filled with fertilized eggs. They have a distinct operculum at one end, are oval, and are light brown in color. They measure 33 by 19 $\mu$  at the inner end of the uterus and 44 by 23 $\mu$  at the opening of the uterus into the genital atrium. In spite of the crowding of the uterus with eggs spermatozoa were observed to pass in large numbers from the genital atrium down the uterus to the ootype. The activity of these sperm frequently caused the eggs to back up into the ootype and even into the distal end of Laurer's canal. At times the sperm masses occupy half of the uterus.

Fertilization occurs in the ootype. The naked protoplast comes down the oviduct at irregular intervals. Material from the common vitelline duct is then laid around the ovum, after which the shell is added.

#### DISCUSSION

The Brachycoeliinae as originally constituted by Looss (1899:608) have come to include Brachycoelium, Pycnoporos, Phaneropsolus, and Lecithodendrium. To this group must now be added the new genus Acanthatrium, previously embodied in part in Lecithodendrium. European investigators have divided this group into two parts, one consisting of those genera in which a muscular cirrus pouch is present and one containing those genera where a cirrus bulb is wanting, or, at most, parenchymatous in structure. Lühe (1901:173) and Looss (1902:815) have even suggested that those genera including forms without muscular cirrus should be withdrawn from the Brachycoeliinae and placed in a new subfamily, the Lecithodendriinae. The genus Acanthatrium readily falls into the latter group, because species of this genus lack any evidence of muscular structure in the region of the ejaculatory duct.

An examination of the various species comprehended up to this time under the head Lecithodendrium shows that exact data on the seminal receptacle are lacking in many species. Moreover the out-

line of the ovary is decidedly varied, being entire in certain species and decidedly lobed or sinuate in closely related ones. But the position and type of the vitellaria and of the testes, and the presence or absence of spines in the genital atrium give a basis for a natural division of these species into three groups. The first group contains those in which the genital atrium is lined with conspicuous spines and in which the testes are antacetabular in a plane with the genital pore. These species, *nycteridis* nov. spec., and *sphaerula* Looss belong to the genus *Acanthatrium*. The second group consists of those species in which the genital atrium is aspinose, in which the vitellaria are lateral to the pharynx, but in which the testes are in the plane of the acetabulum. To this group belong the species *ascidia* van Beneden, *chefrenianum* Looss, *chilostomum* Mehlis, *cordiforme* Braun, *glandulosum* Looss, *obtusum* Looss, *posticum* Stafford, and *pyramidum* Looss. These species belong to the genus *Lecithodendrium sensu stricto*. The third group contains species, which, like those just mentioned, have an aspinose genital atrium and testes in the plane of the acetabulum, but in which vitellaria are conspicuously posterior to the ceca and near to the acetabulum. To this group belong the species *granulosum* Looss, *hirsutum* Looss, and *urna* Looss, and for them I propose on the basis of this distinction a new genus, *Mesodendrium*. Other species at one time or another referred to *Lecithodendrium* have either been removed from this genus or are so inadequately described that their exact position can not be fixed with certainty.

#### SUMMARY

1. *Acanthatrium nycteridis* nov. gen., nov. spec., from *Nycteris borealis-borealis* is described.
2. The excretory system of this species is based on a fundamental four-fold grouping of triplet flame cells, which, by comparison, suggest that the four-fold grouping is a common denominator of the several sub-families of the Brachycoeliidae.
3. Analysis of the species of *Lecithodendrium sensu lato* makes it necessary to recognize three genera from this group, *Acanthatrium* nov. gen., *Lecithodendrium sensu stricto*, and *Mesodendrium* nov. gen.

## EXPLANATION OF PLATE

Dorsal view of *Acanthatrium nycteridis*, showing reproductive organs. X 340.

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